A Late Pleistocene Vertebrate Assemblage from the St. Marks River, Wakulla County, Florida

TIMOTHY S. YOUNG[1] AND JOSHUA LAERM
The University of Georgia Museum of Natural History and Department of Zoology, University of Georgia, Athens, Georgia 30602

ABSTRACT—The St. Marks River in the central panhandle of Florida contains a well known, apparently late Pleistocene vertebrate assemblage that has been only superficially examined and reported. Previous collections are reviewed, and we report on new fossil materials recently obtained. Included are 37 species of mammals, 26 birds, 13 reptiles, 2 amphibians, and 9 fish. Of these, 14 species of mammals and 2 reptiles are limited solely to the Pleistocene. The fauna is mixed and reflects heterochronous deposition over time beginning at least in the late Pleistocene (Wisconsinan) and extending through the Recent. The species present reflect mixed woodland and grassland terrestrial communities as well as mixed estuarine and freshwater aquatic communities. The St. Marks River assemblage compares well to other contemporaneous late Pleistocene Florida panhandle sites. One extralimital taxa is reported, *Pylodictic* cf. *P. olivaris*, the flathead catfish, whose natural range has not been reported east of the Mobile Bay drainage basin.

Florida is characterized by a number of rich and well documented Pleistocene vertebrate assemblages (Webb 1974*a*, Lundelius et al. 1983, Webb and Wilkins 1984) that contain a mixture of extant and extinct South American immigrant and North American endemic species. The majority of these sites are distributed throughout the peninsular portion of the State (Webb 1974*a*, Webb and Wilkins 1984). However, with the exceptions of Wakulla Springs (Brodkorb 1963, Webb 1974*a*), Chipola River (Martin 1969, Webb 1974*a*), and Aucilla River (Olson 1972, Webb 1974*a*, Gillette 1976*a*) very little attention has been devoted to sites on the panhandle of Florida. The St. Marks River, located 32 km south of Tallahassee in Wakulla County, is a particularly rich, late Pleistocene panhandle site that has only been superficially investigated (Gillette 1976*b*, Steadman 1980).

Leidy (1870), who reported on the occurrence of *Mammuthus columbi* (now *M. jeffersonii*), provided the first record of vertebrate fossil remains recovered from the St. Marks River, though the exact locality was not given. Subsequently, the St. Marks River has attracted

[1]Present address: Department of Zoology, University of Florida, Gainesville, FL 32611.

numerous amateur collectors but a limited number of professionals. Storrs Olson (National Museum of Natural History) collected from a broad, shallow water area in Wakulla County near the Leon County line several times between 1968 and 1970. Tall Timbers Research Station sponsored collecting parties in the same area during 1974. Published accounts of the fauna are those of Gillette (1976*b*), who reported the mammals, and Steadman (1980), who discussed two specimens of *Meleagris gallopavo*. Storrs Olson (personal communication) examined the avian assemblage from the previous collections; however, he did not publish his findings.

With the exception of *Mammuthus* sp. *Mammut americanum*, *Synaptomys australis*, and possibly *Equus*, the majority of species from Gillette's (1976*b*) report are extant. Gillette (1976*b*) suggested that the assemblage was important because it represented a restricted temporal interval of the latest Pleistocene through the Holocene. Olsen (personal communication) felt the avian assemblage was very similar to that of today. Steadman (1980) characterized the site as a late Pleistocene deposit. The St. Marks River has also been reported by Lundelius et al. (1983) as being a naturally accumulating, fluvial Rancholabrean deposit.

The purpose of our study is to review previous collections and to report on new fossil materials recently obtained from the St. Marks River. We provide information regarding the paleoenvironment of the depositional area and compare the St. Marks River fauna to other late Pleistocene faunas in the region.

GEOLOGICAL AND GEOGRAPHIC SETTING

Florida consists of five naturally occurring topographical divisions (Cooke 1939:14). The St. Marks River drainage basin is in the coastal lowlands division. Although the panhandle of Florida shows a topographical record of the relict shorelines, no ages have been securely assigned to these formations (Winker and Howard 1977*a*,*b*). The coast line of the panhandle during the late Pleistocene is reported to be similar to that of today (Winker and Howard 1977*b*).

The St. Marks River is considered part of the Gulf Hammock region; it is underlain by the Upper Oligocene Suwannee Limestone (Harper 1914:302). The early Miocene St. Marks Formation overlies the Suwannee Formation in almost all of Wakulla County (Puri and Vernon 1964). The St. Marks Formation was revised to include the calcareous downdip facies of the Tampa Formation (Puri 1953). These formations can be found in many areas as outcroppings in springs and rivers (Spencer and Rupert 1987). The surface is mostly loamy

sand, probably Pleistocene in origin. The soil surrounding the river's edge is classified as Tooles-Nutall fine sand that is frequently flooded (Spencer and Rupert 1987). Topographically the region is nearly level, except for a few hilly areas (Harper 1914:302). The whole area east of the Apalachicola River in Wakulla County is called the Woodville Karst Plain (Hendry and Sproul 1966, Yon 1966), characterized by sand dunes overlying limestone (Hendry and Sproul 1966:154).

The St. Marks River is fed by the St. Marks Spring located just inside Leon County (Fig. 1). Limestone lines the perimeter of the spring. The vent is located about 26 m below the water surface and has an average base flow of 14.7 m^3/sec (Rosenau et al. 1977). This measurement was taken approximately 800 m down stream

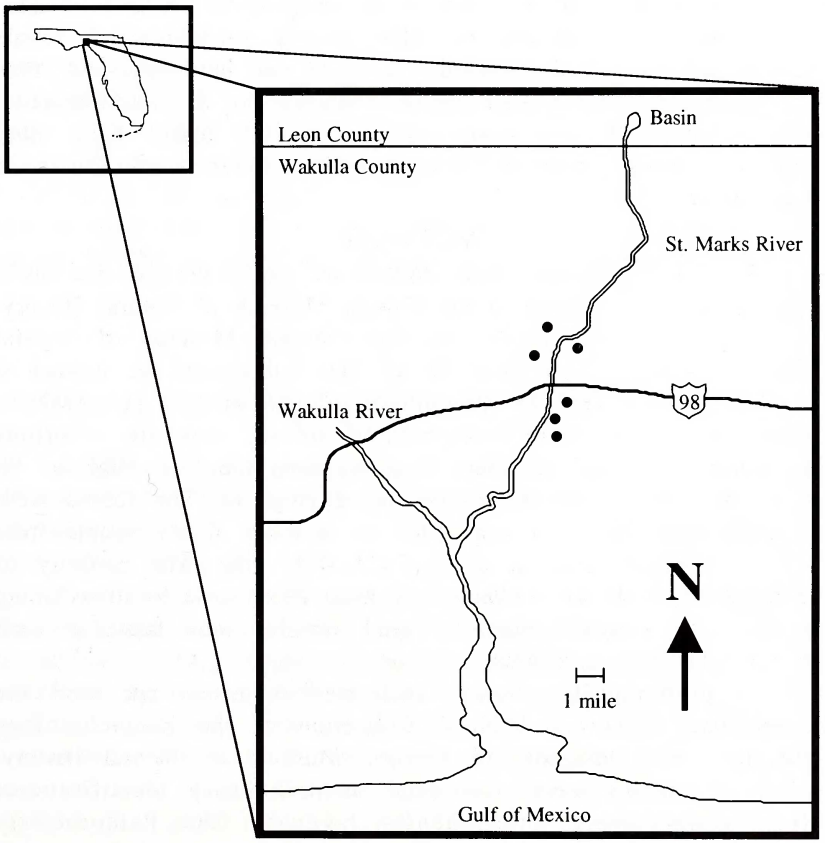

Fig. 1. St. Marks River in the central panhandle of Florida. Solid circles indicate 1987 collection sites.

from the main vent. The pH and temperature as measured 16 July 1974 were 7.6 and 21.0C, respectively. Newport Spring also feeds the river about 800 m north of the U.S. Highway 98 bridge. The discharge of the spring as measured 2 March 1972 was 0.23 m^3/sec with a pH of 7.8 and water temperature of 19C (Rosenau et al. 1977).

Primary depositional site(s) were not located. The fossils are probably eroding out of the banks along much of the length of the river and washed down river by the current. Dense accumulations of fossils may be found in sand deposits, around submerged debris, and in deep holes along the entire length of the river.

The St. Marks River with its shallow, relatively clear waters with abundant fossil and archaeological materials has been a popular recreational S.C.U.B.A. diving are for the past 30 years. Local divers report huge quantities of fossils have been recovered by amateur collectors. One of us (J.L.) observed an entire pick-up truck load of fossils being removed in 1978. Local divers report that have collected "tons of it." Although several large private collections of St. Marks material exist, unfortunately they have been mixed with fossils from other regional aquatic systems which makes their inclusion here inappropriate.

METHODS

We made extensive new collections and reviewed previously collected materials housed at the Florida Museum of Natural History, University of Florida (UF), and the National Museum of Natural History (USNM), Washington, D. C. Our collections are housed at the University of Georgia Museum of Natural History (UGAMNH). Collection efforts were concentrated in six separate locations approximately 3.2 km in either direction from the U.S. Highway 98 bridge that crosses the St. Marks River (Fig. 1). The fossils were collected from 16 to 19 July 1987 by a team of six people from the University of Georgia using S.C.U.B.A. gear. The majority of the fossil materials was collected by hand from these locations along the river. In addition, extensive sand samples were taken at each site for subsequent screening.

To preliminarily identify recovered materials we used the Comparative Reference Skeletal Collection of the Zooarchaeology Laboratory, the University of Georgia Museum of Natural History. Reference sources were also used in preliminary identifications. All materials were subsequently taken to the Paleontology Laboratory, the Florida Museum of Natural History, University of Florida, to confirm identifications. Notes were made on the element identified, side, and fusion of bones where possible.

SYSTEMATIC PALEONTOLOGY

Standardized common and current scientific names follow Robins et al. (1991) for fishes; Collins (1990) for amphibians and reptiles; American Ornithologists' Union (1983) for birds, and Kurtén and Anderson (1980) and Jones et al. (1992) for mammals. Museum acronyms are indicated in the introduction. A complete faunal listing of the species recovered from the St. Marks site is provided in Table 1.

CLASS MAMMALIA

Order Didelphimorphia
Family Didelphidae
Didelphis virginiana Kerr
Virginia Opossum

Material—A single left dentary, UGAMNH1735.

Remarks—The single element is identical to that of modern *Didelphis virginiana*. This was the only marsupial species present in North America during the Pleistocene. It is known from numerous fossil sites in Florida (Webb 1974*a*). Its stratigraphic range includes Middle Blancan to Recent (Kurtén and Anderson 1980). It occurs in a variety of habitats, but it is usually found in forests and woodlands near water (Gardner 1973). We follow Marshall et al. (1990) in the use of the ordinal name Didelphimorphia as do Jones et al. (1992).

Order Xenarthra
Family Dasypodidae
Holmesina septentrionalis (Leidy)
Northern Pampathere

Material—Right astragulus, UGAMNH2012; right calcaneus, UGAMNH2159; right metacarpus II, UGAMNH1981; two phalanges, UGAMNH1982-1983; numerous dermal plates, UGAMNH1954-1980, 1984-2029, 2160, 2166.

Remarks—The species is known from numerous sites throughout the South and Southeast. Its range is somewhat similar to that of its modern relative, *Dasypus novemcinctus*, and *Holmsina* had a similar preference for open woodlands (Kurtén and Anderson 1980). Like its modern counterpart, *Holmsina* probably fed on insects and various invertebrates. Kurtén and Anderson (1980) suggest this diet might have restricted them to relatively warm climates where food was available year round. Specimen UHAMNH2159, a right calcaneus, has rodent and carnivore gnaw marks that occurred prior to fossilization. Its stratigraphic range is early Irvingtonian to Wisconsinan (Kurtén and Anderson 1980).

Table 1. List of vertebrate species recovered from the St. Marks River. The figure † indicates extinct forms.

Class Mammalia
- **Order Didelphimorphia**
  - Family Didelphidae
    - *Didelphis virginiana*
- **Order Xenarthra**
  - Family Dasypodidae
    - †*Holmesina septentrionalis*
  - Family Megalonychidae
    - †*Megalonyx jeffersonii*
  - Family Mylodontidae
    - †*Glossotherium harlani*
- **Order Primates**
  - Family Hominidae
    - *Homo sapiens*
- **Order Lagomorpha**
  - Family Leporidae
    - *Sylvilagus* sp.
- **Order Rodentia**
  - Family Castoridae
    - *Castor canadensis*
  - Family Geomyidae
    - *Geomys pinetis*
  - Family Muridae
    - *Microtus* sp.
    - *Microtus pinetorum*
    - *Neofiber alleni*
    - *Ondatra zibethicus*
    - *Synaptomys australis*
- **Order Carnivora**
  - Family Mustelidae
    - *Mustela* sp.
    - *Lutra canadensis*
    - *Mephitis mephitis*
  - Family Canidae
    - *Canis* sp.
    - †*Canis dirus*
    - *Urocyon cinereoargenteus*
  - Family Procyonidae
    - *Procyon lotor*
  - Family Ursidae
    - *Ursus* cf. *U. americanus*
  - Family Felidae
    - *Felis* sp.
    - †*Smilodon* sp.
- **Order Proboscidea**
  - Family Mammutidae
    - †*Mammuthus jeffersonii*
  - Family Elephantidae
    - †*Mammut americanum*
- **Order Perissodactyla**
  - Family Equidae
    - *Equus* sp.
  - Family Tapiridae
    - †*Tapirus* sp.
- **Order Artiodactyla**
  - Family Tayassuidae
    - †*Platygonus compressus*
  - Family Suidae
    - *Sus scrofa*
  - Family Camelidae
    - †*Hemiauchenia macrocephala*
    - †*Palaeolama mirifica*
  - Family Cervidae
    - *Odocoileus virginianus*
  - Family Bovidae
    - *Bison* sp.
    - *Bison bison*
    - *Bos taurus*

Class Aves
- **Order Podicipediformes**
  - Family Podicipedidae
    - *Podiceps auritus*
    - *Podilymbus podiceps*
- **Order Pelecaniformes**
  - Family Phalacrocoracidae
    - *Phalacrocorax auritus*
- **Order Ciconiformes**
  - Family Ardeidae
    - *Ardea herodias*
    - *Butorides virescens*
    - *Egretta caerulea*
  - Family Threskiornithidae
    - *Eudociums albus*
- **Order Anseriformes**
  - Family Anatidae
    - *Aix sponsa*
    - *Anas acuta*

Table 1. Continued.

Anas americana
Anas discors
Anas platyrhynchos
Anas sp.
Aythya collaris
Aythya sp.
Branta canadensis
Bucephala albeola
Lophodytes cucullatus
Mergus merganser

Order Falconiformes
Family Accipitridae
Buteo jamaicensis
Pandion haliaetus

Order Galliformes
Family Phasianidae
Meleagris gallopavo

Order Gruiiformes
Family Rallidae
Fulica americana
Gallinula chloropus
Family Aramidae
Aramus guarauna

Order Strigiformes
Family Strigidae
Strix varia

Class Reptilia

Order Testudines
Family Chelydridae
Chelydra serpentina
Family Kinosternidae
Gen. et spec. indet.
Family Emydidae
Pseudemys concinna
Pseudemys floridanus
Pseudemys nelsoni
Trachemys scripta
Terrapene carolina
Terrapene carolina putnami
Family Testudinidae
Geochelone incisa
Geochelone sp.
Gopherus polyphemus
Family Trionychidae
Trionyx sp.

Order Squamata
Family Colubridae
Elaphe obsoleta
Gen et spec. indet.

Order Crocodilia
Family Alligatoridae
Alligator mississippiensis

Class Amphibia

Order Caudata
Family Sirenidae
Siren sp.

Order Anura
Gen. et spec. indet.

Class Osteichthyii

Order Lepisosteiformes
Family Lepisosteidae
Lepisosteus sp.

Order Amiiformes
Family Amiidae
Amia calva

Order Siluriformes
Family Ictaluridae
Pylodictis cf. *P. olivaris*
Family Ariidae
Ariopsis felis

Order Salmoniformes
Esocidae
Esox sp.

Order Perciformes
Family Percichthyidae
Morone saxatilis
Family Sparidae
Archosargus probatocephalus
Family Sciaenidae
Sciaenops ocellatus
Family Mugilidae
Mugil sp.

Family Megalonychidae
Megalonyx jeffersonii (Desmarest)
Jefferson's Ground Sloth

Material—A single phalanx, UGAMNH2135, and tooth, UGAMNH2136.

Remarks—Jefferson's ground sloth occurred in woodlands where it apparently fed on nuts, berries, leaves, and twigs (Stock 1925). It is known from a number of sites in the Southeast including Florida (Webb 1974*a*), Georgia (Ray 1967), South Carolina (Hay 1923, Roth and Laerm 1980), and Tennessee (Guilday et al. 1969). It could have tolerated a seasonally cool climate as evidenced by its Pleistocene occurrence in what is now Canada and Alaska (McNab 1985). It is reported from Irvingtonian to Rancholabrean sites with a terminal date of 13,890 years B.P., although Kurtén and Anderson (1980) suggest it may have survived even longer in Florida.

Family Mylodontidae
Glossotherium harlani (Owen)
Harlan's Ground Sloth

Material—Two teeth, UGAMNH2137-2138.

Remarks—This was an open plains and grassland species (Stock 1925). It is reported from Irvingtonian to Rancholabrean sites with a terminal date of 13,890 years B.P., although Kurtén and Anderson (1980) suggest it may have survived even longer in Florida.

Order Primates
Family Hominidae
Homo sapiens Linnaeus
Human

Material—Cranial fragment, UF21280.

Remarks—This single specimen was recovered by Gillette (1976*b*). Unfortunately, the cranial fragment was not available for examination. We are, therefore, unable to comment on the degree of mineralization. No other human remains were recovered in our efforts. The presence of considerable amounts of Native American cultural material (pottery shards) as well as 18-20th century European-American artifacts indicates the St. Marks River was a site of human occupation before and after European contact.

Order Lagomorpha
Family Leporidae
Sylvilagus sp. indet.

Material—Tooth fragment, UF21301.

Remarks—Rabbits are a common component of most Pleistocene sites in Florida. It is surprising no more than a single tooth fragment was encountered in the St. Marks River material. Two species of rabbit occur in the St. Marks region today, the eastern cottontail, *Sylvilangus floridanus*, and the more common swamp rabbit, *S. aquaticus*. The former prefers heavy brushy, forested areas with open areas nearby and edges of swamps. The latter is most common in marshes, swamps, and bottomlands (Golley 1962).

Order Rodentia
Family Castoridae
Castor canadensis Kuhl
Beaver

Material—Left ulna, UGAMNH2126; right upper molar, UGAMNH2125; right M^3, UGAMNH2124; four molars, UF21294.

Remarks—Two beaver species occurred in Florida in the late Pleistocene, *Castoroides ohioensis* and *Castor canadensis*. Both have even been found in the same deposits (Webb 1974*a*); however, only the latter is represented in the St. Marks River fauna. The beaver is found in any suitable water habitat including rivers, streams, lakes, and marshes (Lowery 1974). Its relative rarity in the St. Marks may be related to the presence of *Alligator*. The stratigraphic range is late Blancan to Recent (Kurtén and Anderson 1980).

Family Geomyidae
Geomys pinetis Rafinesque
Southeastern Pocket Gopher

Material—A single lower fourth premolar, UF21291.

Remarks—*Geomys pinetis* is the only species of pocket gopher in the Southeast. It is associated with the sandy soils of the Coastal Plain (Golley 1962) and is present today in the uplands adjacent the St. Marks River. It is known from late Irvingtonian to Recent (Kurtén and Anderson 1980).

Family Muridae
Microtus sp. indet.

Material—Left M^3, UGAMNH2127.

Remarks—This fragment, while certainly *Microtus*, could not be

referred to a species with confidence. We follow Jones et al. (1992) in their use of the familial name Muridae.

Microtus pinetorum (LeConte)
Pine Vole

Material—Right M^2, UGAMNH2128.

Remarks—This molar compares well to modern *Microtus pinetorum*. Regionally, the pine vole can be found in a wide range of habitats from hardwood and pine forests to overgrown fields (Golley 1962). The stratigraphic range is Sangamonian to Recent (Kurtén and Anderson 1980).

Neofiber alleni True
Round-tailed Muskrat

Material—right M^2, UGAMNH2121; right M^3, UGAMNH2123; right M_3, UGAMNH2122; maxilla, UF21293.

Remarks—*Neofiber alleni* is a semi-aquatic mammal that prefers permanent bodies of water with emergent aquatic vegetation (Frazier 1977). Although it has a restricted range today, essentially extreme northern Florida and south Georgia, during the Pleistocene it ranged as far west as Kansas (Hibbard 1943). It is reported from late Irvingtonian to Recent (Kurtén and Anderson 1980). The stratigraphic range is Illinoian to Recent (Kurtén and Anderson 1980).

Ondatra zibethicus (Linnaeus)
Muskrat

Material—Right dentary with M^1 AND M^2, UGAMNH2120; dentary, UF21292.

Remarks—The muskrat, like the round-tailed muskrat, is a semi-aquatic mammal that prefers permanent bodies of water (Nelson and Semken 1970). There is not overlap in the range of the two species today. However, Martin and Webb (1974) indicate they were sympatric in at least two late Pleistocene Florida faunas, Devils Den and Ichetucknee River. The occurrence of the two species in the St. Marks River fauna is not overly suggestive that they were sympatric here in the past because of the apparently heterochronous deposition at St. Marks. Furthermore, although the muskrat does not presently occur in the St. Marks River or Apalachicola River drainages, it is known from the extreme western panhandle and the Upper Coastal Plain of Georgia, a distance of 120 km.

Synaptomys australis Simpson
Florida Bog Lemming

Material—Left mandible with M_1, UF21295.

Remarks—The specimen referred to in Gillette's (1976*b*) review of the St. Marks River is the only record of this species at the site. In Florida it is known primarily from Sangamonian and Wisconsinan assemblages, although elsewhere it is known from the Illinoian through the Wisconsinan (Kurtén and Anderson 1980). Its presence at Devils Den suggests it might have persisted until about 8,000 years B.P. (Martin and Webb 1974), although this radiocarbon date is considered suspect. The Florida bog lemming is similar morphologically to *S. cooperi*, the northern bog lemming, but differs considerably in size; it is about 35% larger than *S. cooperi*. Kurtén and Anderson (1980) suggest it might represent a clinal variate of *S. cooperi*. It was an inhabitant of moist bogs and damp meadows (Burt 1928).

Order Carnivora
cf. Order Carnivora, gen. et sp. indet.

Material—A left coronoid, UGAMNH1881.

Remarks—This specimen, though carnivore-like, could not be identified to the familial level.

Family Mustelidae
Mustela sp. indet.
cf. Weasel

Material—A single left humerus, UGAMNH1738 and right P^3, UGAMNH1736.

Remarks—Two species of weasel, *Mustela frenata* and *M. vison*, are common to the region today. Both are known from the Irvingtonian to Recent and are represented in regional fossil sites (Webb 1974*a*). However, fossil weasels have been reported from very few sites in Florida (Martin 1974, Webb 1974*a*).

Lutra canadensis (Shreber)
River Otter

Material—Left humerus, UGAMNH1741.

Remarks—This material compares well to modern *Lutra canadensis*. The stratigraphic range includes early Irvingtonian to Recent, and the species is represented in numerous regional sites (Kurtén and Anderson 1980). The species occurs in woodlands near rivers and streams but is also known from tidal creeks and marshlands (Lowery 1974).

Mephitis mephitis (Schreber)
Striped Skunk

Material—Right mandible, UGAMNH1746; left humerus, UGAMNH1737.

Remarks—This material compares well to modern *Mephitis mephitis*, which can be found in mixed woodlands, brushlands, or prairies but generally in reasonable proximity to water (Lowery 1974). The stratigraphic range is mid Blancan to Recent (Kurtén and Anderson 1980).

Family Canidae
Canis sp. indet.

Material—Left ilium, UGAMNH1739; right dentary, UGAMNH1878, 1880; right scapula, UGAMNH1879.

Remarks—None of these elements could be identified beyond the generic level. They are well mineralized, suggesting they are not modern *C. familiaris* contaminants. Several species of *Canis* are known from late Pleistocene sites in Florida. These include *C. lupus*, the gray wolf; *C. rufus*, the red wolf; *C. latrans*, the coyote; and *C. dirus*, the dire wolf. Martin (1974) has concluded that only two species, *C. rufus* and *C. dirus*, are common to middle and late Pleistocene deposits of Florida. *Canis lupis* is typical of Irvingtonian deposits, whereas *C. dirus* is representative of the Rancholabrean.

Canis dirus Leidy
Dire Wolf

Material—left radius, UGAMNH1877.

Remarks—*Canis dirus* is known from a number of late Pleistocene sites in Florida (Webb 1974*a*) and is one of the more common species of mammals at numerous Rancholabrean sites throughout North America. It is thought to have inhabited a wide range of habitats because it was a hunter and scavenger (Kurtén and Anderson 1980, Lundelius et al. 1983). The stratigraphic range is early Illinoian to Wisconsinan (Kurtén and Anderson 1980). The most recent terminal date for extinction is given at about 8,000 years B.P. in Florida (Martin and Webb 1974), but somewhat earlier (approximately 9,000-10,000 year B.P.) elsewhere (Kurtén and Anderson 1980).

Urocyon cinereoargenteus (Shreber)
Gray Fox

Material—Right dentary, UGAMNH1743; left frontal, UGAMNH1744.

Remarks—This material is not well mineralized, which suggests that it is a modern contaminant. However, *Urocyon cinereoargenteus* would be expected in this fauna. It can be found in a wide range of habitats today, but brushy and woody areas probably best describe the preferred habitat in the South and Gulf Coast area (Lowery 1974). The stratigraphic range in Florida is Middle Rancholabrean to Recent (Martin and Webb 1974). Elsewhere it is known as early as the Blancan (Kurtén and Anderson 1980).

Family Procyonidae
Procyon lotor (Linnaeus)
Racoon

Material—Three left dentaries, UGAMNH1742, 1747, 1750. A partial skeleton is represented by UF21296.

Remarks—The University of Georgia material is not well mineralized, which suggests it could be a modern contaminant, since *Procyon lotor* is part of the modern fauna. In the Florida panhandle today, the racoon is an inhabitant of forested bottomland swamps. It fossil record in Florida extends from the Late Irvingtonian to Recent (Martin and Webb 1974).

Family Ursidae
Ursidae gen. et sp. indet.

Material—Three phalanges, UGAMNH1745, 1749, 1752.

Remarks—Generic identity of this material is uncertain. In addition to the modern black bear, *Ursus americanus* Pallas, several extinct species of bears are known from the Pleistocene of Florida. These include the cave bear, *Tremarctos floridanus* (Gidley), and the lesser short-faced bear, *Arctodus pristinus* Leidy, all of which persisted at least until the late Wisconsin (Kurtén and Anderson 1980).

Ursus cf. *U. americanus* Pallas
cf. Black Bear

Material—A single right dentary with M_1, UGAMNH1751.

Remarks—This specimen is well mineralized, but it is too worn for positive identification. The black bear can be found in forests and bottomland swamps throughout much of the Southeast (Golley 1962, Lowery 1974). It is represented in numerous late Pleistocene sites. The stratigraphic range is early Irvingtonian to Recent (Kurtén and Anderson 1980).

Family Felidae

Felis sp. indet.

Material—Left radius, UGAMNH1740.

Remarks—This specimen is a large *Felis*, but it is too worn for positive identification. Webb (1974*a*) states that several species of *Felis* are known from the Late Pleistocene of Florida, and include *F. atrox* Leidy, *F. concolor* Linnaeus, *F. onca* (Linnaeus), *F. pardalis* Linnaeus, *F. rufus* Schreber, and *F. yagouaroundi* Geoffroy. Another possibility is *Felis amnicola*, a new, small cat described by Gillette (1976*a*). The description is based on several specimens from various localities in Florida and possibly Georgia.

Smilodon sp. indet.

Material—Left scapho-lunar, UGAMNH1748.

Remarks—The sabertooth cats are reported from a dozen or more late Pleistocene sites in Florida (Webb 1974*a*, Kurtén and Anderson 1980). Slaughter (1963) proposed a series of successional changes in *Smilodon* species throughout the North American Pleistocene. Webb (1974*a*) concurs that records of *Smilodon* in Florida support such a successional outline: *Smilodon gracilis* is a late Blancan and early Irvingtonian; *S. fatalis* is representative of late Irvingtonian and early Rancholabrean sites; and that *S. floridanus* is typical of the late Rancholabrean. The temporal span reflected by other faunal elements from the St. Marks would be more suggestive of the latter species; however, given the similarity of these species, more precise identification is impossible from the limited available material. *Smilodon* could probably have been found in habitats ranging from grassland to woodland (Merriam and Stock 1932, Lundelius et al. 1983).

Order Proboscidea

Proboscidea gen. et sp. indet.

Material—Sesamoid, UGAMNH1098; tusk fragment, UF21255; skull fragment, UF21256; leg fragment, UF21257; vertebral fragment UF21258.

Remarks—These specimens are very definitely proboscidean, but assignment to species is impossible.

Family Mammutidae

Mammut americanum (Kerr)

American Mastodon

Material—Axis fragment, UGAMNH1614; tooth fragments, UGAMNH1612, 1613, 1615, 1616, UF21267 and 21276; tusk fragments, UF21277-21278; proximal humerus, UF21279; calcaneus, UF21290.

Remarks—The morphology of the elements is consistent with its identification as *Mammut americanum*. Dreimanis (1968) suggested that *M. americanum* inhabited coniferous forests. The stratigraphic range is early Blancan to Wisconsinan (Kurtén and Anderson 1980).

Family Elephantidae
Mammuthus jeffersonii (Osborn)
Jefferson's Mammoth

Material—Tooth fragments, UGAMNH1607-1611; tooth fragments, UF21259-21262, 21264-21266; mandibular symphysis, UF21263.

Remarks—The morphology of the tooth fragments and mandibular symphysis is consistent with its identification as *Mammuthus jeffersonii*. Jefferson's mammoth probably inhabited open grasslands (Stock 1963, Harrington et al. 1974). The stratigraphic range is Illinoian to Wisconsinan (Kurtén and Anderson 1980).

Order Perissodactyla
Family Equidae
Equus sp. indet.
Horse

Material—left astragalus, UGAMNH1035; cervical vertebra, UGAMNH1170; left upper cheek tooth, UGAMNH1045; right upper cheek tooth, UGAMNH1031; right lower cheek tooth, UGAMNH1048; cheek tooth, UGAMNH1046, 1047, 1062; right deciduous P^2, UGAMNH1042; left deciduous P^2, UGAMNH1061; right cuneiform, UGAMNH1049; left femoral head, UGAMNH1034; right distal humeral epiphysis, UGAMNH1054; left I_3, UGAMNH1036; right I^2, UGAMNH1041; lower incisor, UGAMNH1056; left I^3, UGAMNH1059; left I^1, UGAMNH1060; incisive fragment, UGAMNH1032; left upper molar, UGAMNH1038; right M^2,UGAMNH1039; right M_3, UGAMNH1044; left M^3, UGAMNH1057; upper molar fragment UGAMNH1029; left navicular, UGAMNH1063; medial phalanges UGAMNH1030, 1050, 1053; distal phalanx, UGAMNH1051; proximal phalanx, UGAMNH1055; left P^2, UGAMNH1037; right P^2, UGAMNH1040; left upper premolar, UGAMNH1043; right lower premolar, UGAMNH1058; left scapula, UGAMNH1052; sesamoid, UGAMNH1033; medial phalanx, UF21228; teeth, UF21229-21238; teeth UF21240-UF21254; cheek tooth, axis, and pelvis, UF21297.

Remarks—*Equus* is well represented in St. Marks River. A portion of the material is poorly mineralized and probably represent contaminants of the modern *E. caballus*. However, the majority of elements are well fossilized, and it is likely that most of the material

is of late Pleistocene origin. Given the uncertain relationships of late Pleistocene horses in general and the likelihood of heterochronous deposition, we did not assign the material to a particular species. Pleistocene *Equus* was generally a grassland species (Kurtén and Anderson 1980).

Family Tapiridae

Tapiridae gen. et spec. indet.

Material—Left dentary, UGAMNH2068.

Remarks—This edentulous specimen could not be assigned to *Tapirus* with confidence, although the morphology is similar.

Tapirus sp. indet.

Tapir

Material—Right upper deciduous premolar, UGAMNH2070, left upper deciduous premolar, UGAMNH2071; right fibula, UGAMNH2069.

Remarks—The available material, while certainly *Tapirus*, could not be referred to a species with confidence. Tapirs occur in wet woodlands (Simpson 1945, Gray and Crammer 1961).

Order Artiodactyla

Family Tayassuidae

Platygonus compressus LeConte

Flat-headed Peccary

Material—Axis, UGAMNH2072.

Remarks—The material has the diagnostic characters of *Platygonus compressus* which is thought to have wide environmental tolerances, but was probably most associated with open woodlands (Martin and Guilday 1967, Ray et al. 1970). The stratigraphic range is Sangamonian to Wisconsinan (Kurtén and Anderson 1980).

Family Suidae

Sus scrofa Linnaeus

Pig

Material—Left maxilla with P^3 and P^4, UGAMNH1159; right humeral fragment, UGAMNH1160; right femoral diaphysis, UGAMNH1162; right radial fragment, UGAMNH1161; left humeral fragments, UGAMNH1163, 1158; right ilial fragment, UGAMNH1157; distal humeral fragment, UGAMNH1178; left femur, UGAMNH1156.

Remarks—None of the pig material showed evidence of significant mineralization. The pig was introduced during historic times and represents a domesticate. Specimen UGAMNH1178 shows marks of a saw.

Family Camelidae

Camelidae gen. et sp. indet.

Material—Proximal phalanges, UGAMNH1647, 1648; right scaphoid, UGAMNH1649; right astragalus, UGAMNH1650; right scapula, UGAMNH1651; left proximal femoral fragment, UGAMNH1652.

Remarks—These specimens have distinctive camelid familial characters, but cannot be assigned to a particular species.

Hemiauchenia macrocephala (Cope)

Large-headed Llama

Material—Proximal phalanges, UGAMNH2151, 2152.

Remarks—The identification of these elements to *Hemiauchenia macrocephala* is based on the size of the phalanges. According to Webb (1974*b*), *H. macrocephala* was a plains and grasslands inhabitant. The stratigraphic range is Wisconsinan to Recent (Kurtén and Anderson 1980). Because this species has such a limited stratigraphic range, at least a portion of the deposit can be correlated to the Wisconsinan.

Paleolama mirifica (Simpson)

Stout-legged Llama

Material—Left proximal metacarpal fragment, UGAMNH2146; right humerus, UGAMNH2145; left metatarsus, UGAMNH2158; left M_3, UGAMNH2147; metapodial, UGAMNH2148; right distal humerus, UGAMNH2149; left pisiform, UGAMNH2150.

Remarks—The stratigraphic range is late Irvingtonian to Wisconsinan (Kurtén and Anderson 1980). Webb (1974*b*) reports them to be an inhabitant of grasslands and savannahs. Specimen UGAMNH2158, a left metatarsus, has longitudinal cracks indicative of weathering prior to fossilization.

Family Cervidae

Odocoileus virginianus (Zimmerman)

White-tailed Deer

Material—Antler fragments, UGAMNH1103, 1106, 1134, 1148; left astragalus, UGAMNH1101, 1124, 1210, 1757; right astragalus, UGAMNH1071, 1113, 1125, 1677, 1758, 2162; right calcaneus, UGAMNH1150, 1181, 1204, 1756; left calcaneus, UGAMNH1069, 1073, 1077, 1079, 1205, 1653, 2153, 2154, 1667, 1678; right cubonavicular, UGAMNH1074, 1111; right dentary with P_1, P_2, P_3, M_2, M_3, UGAMNH1081; left dentary with M_1, UGAMNH1131; right dentary with M_1, M_2, M_3, UGAMNH1108, 1126; right dentary with P_2, P_3, M_1, M_2, M_3, UGAMNH1191; right proximal femoral fragment, UGAMNH1184; femoral diaphysis, UGAMNH1064; left femoral head,

UGAMNH1129; left femoral diaphysis, UGAMNH2163; right distal femur, UGAMNH11139; left distal femoral fragment, UGAMNH1085, 1088; left femoral lesser trochanter, UGAMNH1130; right femoral diaphysis, UGAMNH1139, 2164; right frontal with antler, UGAMNH1068, 1099; left frontal with antler, UGAMNH1012, 1082, 1118, 1121, 1666; frontal with antler pedicle, UGAMNH1196, 1203; right humeral fragments, UGAMNH1075, 1100, 1122, 1133, 1142, 1661, 1668; left humeral fragments, UGAMNH1070, 1093, 1136, 1137, 1143, 1185, 1186, 1235, 1679; right ilial fragments, UGAMNH1076, 1090, 1681; left ilial fragments, UGAMNH1079, 1086, 1147; left ischial fragments, UGAMNH1105, 1119, 1682; right lunate, UGAMNH1112; right maxilla with P^4, M^1, UGAMNH1206; left metacarpal fragments, UGAMNH1087, 1102, 1114, 1115, 1146, 1180, 1198, 1663; right metacarpal fragments, UGAMNH1072, 1084, 1092, 1097, 1116, 1665; metacarpal diaphysial fragments, UGAMNH1104, 1193-1195, 1670; right metatarsal fragments, UGAMNH1091, 1183, 1201, 1659, 1669, 1675, 1759; metatarsal diaphysial fragments, UGAMNH1117, 1199, 1200, 1208, 1212, 1656, 1672, 1673, 1676;

left metatarsal fragments, UGAMNH1120, 1192, 1654, 1655, 1662, 1664, 1671; right M^1, UGAMNH1109, UGAMNH1151; left M^3, UGAMNH1289; right M^3, UGAMNH1190; left petrous, UGAMNH1110, 1128, 1202, 1214; medial phalanx, UGAMNH1080, 1141, 1209, 1213, 1753, 1754; proximal phalanx, UGAMNH1078, 1109, 1127, 1182, UGAMNH1211, 1755; left radial fragment, UGAMNH1065; right radial diaphysial fragment, UGAMNH1067; left radial fragments, UGAMNH1207, 2165; right radial fragments, UGAMNH1144; sacrum, UGAMNH1089; left scapular fragments, UGAMNH1140, 1188; right scapular fragments, UGAMNH1094, 1145; right distal tibial fragments, UGAMNH1095, 1123, 1658, 1680; left distal tibial fragments, UGAMNH1096, 1657; left proximal tibial fragment, UGAMNH1674; right proximal ulnar fragment, UGAMNH1132; left proximal ulnar fragment, UGAMNH1197; thoracic vertebral fragment, UGAMNH1760; lumbar vertebral fragment, UGAMNH1187; cervical vertebral fragment, UGAMNH1066; atlar fragments, UGAMNH1083, 1149; axial fragment, UGAMNH1660; antler, UF21289; five mandibles, UF21298.

Remarks—The deer material shows a considerable range of mineralization. A significant portion is poorly mineralized and probably represents modern contaminants. The remaining material, however, is well mineralized, but mineralization alone is a poor indicator of possible Pleistocene age. The stratigraphic range of species is middle Blancan to Recent (Kurtén and Anderson 1980). *Odocoileus* is a woodland and forest edge species (Golley 1962, Lowery 1974, Lundelius et al. 1983).

Family Bovidae
Bovidae gen. et sp. indet.

Material—Proximal phalanges, UGAMNH1621, 1627, 1631, 1632; left lunate, UGAMNH1633, 1634; left lunar, UGAMNH1625; left scapual spine, UGAMNH1635; rib head, UGAMNH1636; right scapula, UGAMNH1622; right P_4, UGAMNH1623; left distal humerus, UGAMNH1624; left proximal femur, UGAMNH1626; right distal humeral epiphysis, UGAMNH1628; metatarsal diaphysial fragment, UGAMNH1629; left proximal tibial fragment, UGAMNH1630; tooth fragments, UF21239, 21281, 21282, 21285, 21288; distal humerus, UF21283; horn core tip, UF21284.

Remarks—These elements are definitely bovid but the available material does not permit specific distinction.

Bison bison (Linnaeus)
Bison

Material—Right M_2, UGAMNH1620; left P_3, UGAMNH1619; left P_2, UGAMNH1618; right M^2, UGAMNH1617; molar UF2299.

Remarks—While Jones et al. (1992) have employed *Bos bison* for the American bison, we continue the traditional use of *Bison bison*. Two species of bison are known from Florida. The giant bison, *B. latifrons*, is known from Illinoian and Sangamonian and survived up until the late Wisconsinan. The American buffalo or bison, *B. bison*, was widespread throughout the Wisconsinan through the Recent (Kurtén and Anderson 1980). *Bison* is typically associated with grasslands, though in the Southeast may well have ranged into woodlands (Golley 1962, Stock 1963). It became extinct in the southeastern United States early in the 19th Century.

Bos taurus Linnaeus
Cow

Material—Right proximal humeral diaphysis, UGAMNH10863; left scapula, UGAMNH1155; left ilium, UGAMNH1152, 1154; right metatarsal diaphysis, UGAMNH117; right proximal humerus, UGAMNH1177; right distal humerus, UGAMNH1176; orbital portion of right maxilla, UGAMNH1153; right proximal tibia, UGAMNH1171; right distal femoral epiphysis, UGAMNH1172; right astragalus, UGAMNH1173; distal phalanx, UGAMNH1174; metapodial, UF21300.

Remarks—Bos taurus was introduced into North America sometime after 1492. All elements were poorly mineralized. The presence of cow indicates the site has modern contaminants.

CLASS AVES

Order Podicipediformes
Family Podicipedidae
Podiceps auritus (Linnaeus)
Horned Grebe

Material—Distal portion of left ulna, USNM209968.

Remarks—Today the species winters in coastal areas and infrequently occurs in freshwater (Sprunt 1954).

Podilymbus podiceps (Linnaeus)
Pied-billed Grebe

Material—Right humerus, USNM210293, 210294, 210301, 210302; humerus, USNM210311; right proximal humerus, USNM210304; left humerus, USNM210307; left tibial fragments, USNM210292, 210308, 210309, 210315, 210322, 210325, 210327; right tibia, USNM210297, 210300, 210312, 210316, 210317; left ulna, USNM210296, 210303, 210305, 210306, 210310, 210328, 210329; right ulna USNM210313, 210321; radius, USNM210298; right coracoid, USNM210319; left coracoid, USNM210320; left femur, USNM210298; right carpometacarpus, USNM210321; left carpometacarpus, USNM210323; scapula, USNM210324; pedal phalanx, USNM210326; tarsometatarsus, USNM210314, 210318; left tibia, USNM210306.

Remarks—The species inhabits freshwater marshes and ponds, but also is associated with saltwater in winter (Sprunt 1954).

Order Pelecaniformes
Family Phalacrocoracidae
Phalacrocorax auritus (Lesson)
Double-crested Cormorant

Material—Left radius, USNM209845; left ulna, USNM209844; scapula, USNM209859; anterior sternum, USNM209843; left coracoid, USNM209858; phalanx 1 of digit II, USNM209861, 209852; phalanx 2 of digit II, USNM209856; left humerus, USNM209846; right humerus, USNM209851; proximal radius, USNM209860; right ulna, USNM209852; distal tibia, USNM209848; right femur, USNM209854; right mandible, USNM209855; left mandible, USNM209850; sternal fragment, USNM209857; left coracoid, USNM209849; right coracoid, USNM209847.

Remarks—This species is distributed in large rivers and lakes as well as brackish and saltwater systems (Sprunt 1954).

Order Ciconiformes
Family Ardeidae
Ardea herodias Linnaeus
Great Blue Heron

Material—Cervical vertebrae, USNM210282, 210283, 210285, 210287; right mandible, USNM210281; mandible fragments, USNM210280, 210286, 210288; maxilla fragment, USNM210279; right coracoid, USNM210291; right proximal humerus, USNM210289; distal tarsometatarsus, USNM210290; right carpometacarpus, USNM210279.

Remarks—The great blue heron has wide ecological tolerances, occurring in freshwater swamps and riparian habitats as well as saltwater marshes (Sprunt 1954).

Butorides striatus (Linnaeus)
Green-backed Heron

Material—Right humerus, USNM209966.

Remarks—*Butorides striatus* and *B. virescens*, sometimes regarded as separate species, are recognized as geographic races of *B. striatus* by the American Ornithologists Union (1983). It occurs along lake margins, streams, ponds, and freshwater and saltwater marshes (Sprunt 1954).

Egretta caerulea (Linnaeus)
Little Blue Heron

Material—Mandibular tip with right ramus, USNM209862.

Remarks—Freshwater swamps and saltwater marshes are the preferred habitats (Sprunt 1954).

Family Threskiornithidae
Eudocimus albus (Linnaeus)
White Ibis

Material—Right humerus, USNM209971; left proximal coracoid, USNM209972.

Remarks—*Eudocibus albus* is associated with swampy forests, marshy sloughs, and saltwater marshes (Sprunt 1954).

Order Anseriformes
Family Anatidae
Aix sponsa (Linnaeus)
Wood Duck

Material—Right carpometacarpus, USNM209931, 209938, 209939, 209944; left carpometacarpus, USNM209934; right ulna,

USNM209927, 209946; left ulna, USNM209926, 209940, 209945; left humerus, USNM209928, 209930, 209932, 209933; right humerus, USNM209941; radius, USNM209929, 209936; scapula, USNM209942, 209943; proximal tibia, USNM209935; right coracoid, USNM20992; right femur, USNM209925; right tarsometatarsus, USNM209937.

Remarks—The species is common today in freshwater woodland rivers, ponds, and marshes (Sprunt 1954).

Anas sp. indet.

Material—Right ulna, UGAMNH2078.

Anas acuta Linnaeus
North Pintail

Material—Left coracoid, USNM209965.

Remarks—The pintail is associated with freshwater marshes, ponds, and lakes (Sprunt 1954).

Anas americana Gmelin
American Wigeon

Material—Left humerus, USNM210270; left ulna, USNM210267, 210273; right scapula, USNM210278; scapula USNM210272, 210274; right coracoid, USNM210268, 210275, 210276; right ulna, USNM210277; phalanx 1 of digit II, USNM210269; radius, USNM210271.

Remarks—This species is an inhabitant of freshwater marshes, ponds, and shallow lakes (Sprunt 1954).

Anas discors Linnaeus
Blue-winged Teal

Material—Left carpometacarpus, USNM209865, 209866, 209872-209874; right carpometacarpus, USNM209870, 209871; right humerus, USNM209869; right coracoid, USNM209868; left ulna, USNM209864.

Remarks—Sprunt (1954) reports the species from freshwater ponds and lakes.

Anas platyrhynchos Linnaeus
Mallard

Material—Left humerus, USNM209910, 209911, 209914; right humerus, USNM209913, 209918; right scapula, USNM209916; left scapula, USNM209917; left coracoid, USNM209919; right coracoid, USNM209912; right carpometacarpus, USNM209920; furcula, USNM209915.

Remarks—The mallard prefers freshwater lakes and marshes (Sprunt 1954).

Aythya sp. indet.

Material—Right carpometacarpus, UGAMNH2073; left distal tibiotarsus, UGAMNH2077.

Aythya collaris (Donovan)
Ring-necked Duck

Material—Humerus shaft, USNM209899; left humerus, USNM209884, 209878, 209886, 209890, 209894, USNM209910; right humerus, USNM209877, 209893, 209903; left ulna, 209885, 209888, 209897; right ulna, USNM209878, 209892, 209905-209907; left tibia, USNM209880, 209908; right tibia, USNM209909; left carpometacarpus, 209898, 209900; right tarsometatarsus, USNM209881, 209889; left tarsometatarsus, USNM209887; tarsometatarsus, USNM209902; right coracoid, 209895, 209896; proximal radius, USNM209882; distal radius, USNM209883; radius, USNM209904; right scapula, USNM209891; cervical vertebra, USNM209901.

Remarks—This species is associated most commonly with wooded lakes, ponds, and rivers, but also is reported from saltwater systems (Sprunt 1954).

Branta canadensis (Linnaeus)
Canada Goose

Material—Right coracoid, UGAMNH2074; right tarsometatarsus, USNM209875; right distal carpometacarpus, USNM209876.

Remarks—Both USNM specimens from the 1970s are noted by Storrs Olson (personal communication) as small and possibly represent either a small subspecies or juveniles. The UGAMNH specimen from 1987 is large. Sprunt (1954:53) states the center of abundance in Florida for modern *Branta canadensis* is the St. Marks Refuge. This coracoid could possibly be assigned to *Branta* cf. *B. dickeyi* on the basis of size. Steven Emslie (Point Reyes Bird Observatory, personal communication) examined the St. Marks River specimen and thought it could be assigned to *B. dickeyi*. Measurements of the coracoid are larger than modern *B. canadensis*, but there is some overlap. Emslie (personal communication) reported a large *B. dickeyi* from the early Pleistocene of Florida. We refer the coracoid conservatively to *B. canadensis*. The species prefers freshwater lakes, rivers, and marshes (Sprunt 1954).

Bucephala albeola (Linnaeus)
Bufflehead

Material—Right carpometacarpus, USNM209969.

Remarks—The bufflehead is most common in saltwater bays and estuaries, and rarely in freshwater lakes and ponds (Sprunt 1954).

Lophodytes cucullatus (Linnaeus)
Hooded Merganser

Material—Right proximal humerus USNM209975; right distal humerus USNM209976, 209980; right humerus, USNM209977; left humerus, USNM209978; left ulna, USNM209979.

Remarks—The species occurs in freshwater wooded ponds, rivers, and lakes (Sprunt 1954).

Mergus merganser Linnaeus
Common Merganser

Material—Left distal tarsometatarsus, USNM209863.

Remarks—The common merganser inhabits wooded freshwater rivers and ponds but winters in saltwater bays (Sprunt 1954).

Order Falconiformes
Family Accipitridae
Pandion haliaetus (Linnaeus)
Osprey

Material—Right distal tarsometatarsus, USNM209967.

Remarks—The species prefers fresh and saltwater marshes, lakes, and bays (Sprunt 1954).

Buteo jamaicensis (Gmelin)
Red-tailed Hawk

Material—Left distal humerus, USNM209970.

Remarks—The red-tailed hawk is most common in deciduous forests adjacent to open grasslands (Sprunt 1954).

Order Galliformes
Family Phasianidae
Meleagris gallopavo Linnaeus
Wild Turkey

Material—Left tarsometatarsus, UGAMNH2075; right proximal tibiotarsus, USNM209921; right proximal femur, USNM209922; tarsometatarsus shaft, USNM209923.

Remarks—The species is known from drier swamps, open pine, and hardwoods as well as prairies (Sprunt 1954).

Order Gruiformes
Family Rallidae
Fulica americana (Gmelin)
American Coot

Material—Left distal tarsometatarsus, UGAMNH2076; left tibia, USNM209947, 209951; left distal tibiotarsus, USNM209956, 209958; right distal tibiotarsus, USNM20949, 209952, 209962; right tibiotarsus, USNM209961; tibiotarsus shaft, USNM209955; left ulna, USNM209954, 209966; right carpometacarpus, USNM209950, 209963; right distal femur, USNM209948; distal humerus, USNM209953; right scapula, USNM209959; left coracoid, USNM209960.

Remarks—The American coot is primarily associated with open freshwater ponds and marshes (Sprunt 1954).

Gallinula chloropus (Linnaeus)
Common Moorhen

Material—Right tarsometatarsus, USNM210259, 210260, 210255; right tibiotarsus, USNM210257; radius, USNM210256; left phalanx 1 of digit II, USNM210258.

Remarks—This species prefers freshwater marshes and ponds with heavy aquatic vegetation (Sprunt 1954).

Family Aramidae
Aramas guarauna (Linnaeus)
Limpkin

Material—Left tarsometatarsus, USNM210262, 210266; right tarsometatarsus, USNM210261; right distal tarsometatarsus, USNM210265; left distal tibiotarsus, USNM210263; right distal tibiotarsus, USNM210264.

Remarks—The limpkin is associated with open, freshwater swamps and marshes (Sprunt 1954).

Order Strigiformes
Family Strigidae
Strix varia Barton
Barred Owl

Material—Right proximal femur, USNM209973; right tibiotarsus shaft, USNM209974.

Remarks—The barred owl occurs in low, wet woodlands and swampy forests (Sprunt 1954).

CLASS REPTILIA

Order Testudines

Family Kinosternidae

Kinosternidae gen. et sp. indet.

Material—Nuchal, UGAMNH2038, 2047; right peripheral 1, UGAMNH2041; left peripheral 2, UGAMNH2042; left peripheral 4, UGAMNH2052; right peripheral 4, UGAMNH2044; left peripheral 9, UGAMNH2053; right peripheral 10, UGAMNH2048; plastron fragment, UGAMNH2050, 2051; right pleural 1, UGAMNH2039; left pleural 1, UGAMNH2045; right pleural 2, UGAMNH2043; right pleural 6, UGAMNH2040; pleural fragments, UGAMNH2046, 2049.

Remarks—None of the kinosternid material could be referred to genus or species.

Family Chelydridae

Chelydra serpentina (Linnaeus)

Snapping Turtle

Material—Right peripheral, UGAMNH2034, 2037; left peripheral 4, UGAMNH2035; peripheral UGAMNH2036.

Remarks—This material compares well with modern *Chelydra serpentina*. The species prefers permanent freshwater systems (Conant 1975).

Family Emydidae

Emydidae gen. et spec. indet.

Material—Right epiplastron, UGAMNH1350, 1351, 1355, 1356, 1366, 1368, 1370, 1402, 1403, 1405, 1444, 1462, 1482, 1510, 1530, 1535, 1538, 1546, 1548-1550, 1554, 1872; left epiplastron, UGAMNH1235, 1268, 1282, 1285, 1307, 1343, 1345, 1346, 1349, 1359, 1362, 1375, 1380, 1390, 1394, 1445, 1511, 1551; left humerus, UGAMNH1498; right hypoplastron at inguinal notch, UGAMNH1217, 1237, 1241, 1242, 1281, 1308, 1316, 1322, 1324, 1325, 1357, 1379, 1382, 1418, 1419, 1467, 1469, 1501, 1601, 1871; right hypoplastron at axillary notch, UGAMNH1238, 1240, 1301, 1352, 1358, 1404, 1452, 1474, 1503, 1547, 1553, 1555, 1565; right hypoplastron, UGAMNH1164, 1167, 1215, 1216, 1219, 1221, 1236, 1283, 1333, 1344, 1354, 1376, 1388, 1389, 1429, 1433, 1470, 1473, 1480, 1495, 1521, 1533, 1572, 1575, 1584, 1600, 1867, 1870; left hypoplastron at axial notch, UGAMNH1290, 1361, 1369, 1566, 1602; left hypoplastron at inguinal notch, UGAMNH1168, 1220, 1269, 1280, 1284, 1300, 1302, 1413, 1447, 1449, 1516, 1522, 1527, 1559, 1567, 1582; left hypoplastron, UGAMNH1218, 1222-1225, 1239, 1278, 1279, 1293, 1320, 1342, 1377, 1396, 1423, 1456, 1464, 1471,

1475, 1509, 1513, 1519, 1526, 1532, 1560, 1564, 1569, 1571, 1574, 1578, 1583; neural 1, UGAMNH1328, 1439, 1545, 1558; neural 2, UGAMNH1568, UGAMNH1588; neural 3, UGAMNH1573, 1581; neural 6, UGAMNH1461, 1577; neural 7, UGAMNH1260, 1341, 1579, 1874; neural 8, UGAMNH1271; neural 9, UGAMNH1410; neural, UGAMNH1233, 1258, 1259, 1277, 1291, 1309, 1310, 1312, 1363, 1364, 1372, 1384, 1392, 1393, 1406, 1409, 1414, 1440, 1441, 1494, 1524, 1563, 1570, 1576, 1580, 1589, 2139, 2141; nuchal, UGAMNH1261-1264, 1313, 1411, 1417, 1427, 1457, 1486, 1504, 1508, 1518, 1595; right periphal 1, UGAMNH1165, 1321, 1399, 1398, 1451, 1489, 1525, 1528, 1592, 1866; left peripheral 1, UGAMNH1231, 1245, 1303, 1319, 1454, 1505, 1562; right peripheral 2, UGAMNH1381, 1397, 1407; left peripheral 2, UGAMNH1275, 1298, 1400; right peripheral 3, UGAMNH1169, 1294, 1442, 1531; left peripheral 3, UGAMNH1416, 1421, 1472; right peripheral 4, UGAMNH1540; left peripheral 4, UGAMNH2167; right peripheral 5, UGAMNH1395; left peripheral 5, UGAMNH1425, 1591; right peripheral 6, UGAMNH1244, 1517; left peripheral 6, UGAMNH1274, 1296, 1446;

right peripheral 7, UGAMNH1246, 1428, 1594; left peripheral 7, UGAMNH1329, 1432, 1453, 1455; right peripheral 8, UGAMNH1232, 1552, 2143; left peripheral 8, 1424, 1542; right peripheral 9, UGAMNH1166, 1373, 1484, 1490; left peripheral 9, UGAMNH1249, 1299, 1492; right peripheral 10, H1273, 1276; left peripheral 10, UGAMNH1248; right peripheral 11, UGAMNH1326, 1332, 1429, 1587, 1597; left peripheral 11, UGAMNH1297, 1304, 1408, 1435; peripheral UGAMNH1000, 1243, 1247, 1311, 1420, 1426, 1434, 1442, 1449, 1450, 1536, 1593, 1604; right pleural 1, UGAMNH1234, 1334, 1336, 1374, 1385, 1437, 1485, 1493, 1502, 1554, 1875; left pleural 1, UGAMNH1365, 1371, 1378, 1391, 1438, 1468, 1487, 1507, 2142; left pleural 2, UGAMNH1292; right pleural 2, UGAMNH1465, UGAMNH1491; left pleural 3, UGAMNH1431; right pleural 3, UGAMNH1436, UGAMNH1430; left pleural 4, UGAMNH1460; right pleural 5, UGAMNH1596; left pleural 5, UGAMNH1492; right pleural 6, UGAMNH1488; right pleural 7, UGAMNH1340; Pleural, UGAMNH1265-1267, 1270, 1286-1289, 1295, 1305, 1306, 1314, 1318, 1330, 1339, 1348, 1352, 1367, 1383, 1387, 1401, 1483, 1537, 1543, 1585, 1586, 1590, 1598, 1599, 1603, 1868, 1873; pygal, UGAMNH1317, 1323, 1422, 1458, 1476, 1556, 1561; left scapula, UGAMNH1496, 1497; right scapula, UGAMNH1665; suprapygal, UGAMNH1499; right xiphiplastron, UGAMNH1226-1230, 1250, 1251, 1253, 1255, 1257, 1331, 1347, 1360, 1415, 1463, 1472, 1479, 1481, 1869, 1876; left xiphiplastron, UGAMNH1252, 1254, 1256, 1315, 1335, 1337, 1338, 1386, 1512, 1514, 1515, 1523, 1539, 1544, 1459, 1478.

Remarks—Most of the emydid material could only be identified to the familial level. Species level identification is difficult and requires nearly complete elements. Almost all the material was well mineralized. We are confident that the majority represents Pleistocene deposition as opposed to Recent.

Pseudemys concinna (LeConte)
River Cooter

Material—Left peripheral 3, UGAMNH1882; left peripheral 4, UGAMNH1885; right peripheral 7, UGAMNH1884; right peripheral 11, UGAMNH1883.

Remarks—*Pseudemys concinna* is distinguished by its distinctive carapace. It is most common in slow streams and rivers (Conant 1975).

Pseudemys floridana (LeConte)
Cooter

Material—Left peripheral 3, UGAMNH2030; left pleural 3, UGAMNH2031; left pleural 4, UGAMNH2033; nuchal, UGAMNH2032.

Remarks—The species is most commonly associated with permanent bodies of freshwater including swamps and rivers (Conant 1975).

Pseudemys nelsoni Carr
Florida Redbelly Turtle

Material—Entoplastron, UGAMNH1904; right epiplastron, UGAMNH1920; right hypoplastron axial notch, UGAMNH1889, 1913, 1938; left hypoplastron axial notch UGAMNH1928, 1940; right hypoplastron inguinal notch, UGAMNH1908, 1943; left hypoplastron inguinal notch, UGAMNH1897, 1905; neural 7, UGAMNH1901; neural, UGAMNH1887; nuchal, UGAMNH1914, 1953; right peripheral 1, UGAMNH1899, 1906; right peripheral 2, UGAMNH1929; right peripheral 3, UGAMNH1937; left peripheral 3, UGAMNH1917; right peripheral 4, UGAMNH1930; left peripheral 5, UGAMNH1900; left peripheral 7, UGAMNH1890, 1898; right peripheral 8, UGAMNH1942, 1950; left peripheral 8, UGAMNH1945, 1948; right peripheral 9, UGAMNH1915; left peripheral 9, UGAMNH1886; left peripheral 10, UGAMNH1946, 1947; right peripheral 11, UGAMNH1506, 1918, 1919, 1941; left peripheral 11, UGAMNH1944; peripheral, UGAMNH1907, 1909, 1949; right pleural 1, UGAMNH1534, 1892, 1910; left pleural 1, UGAMNH1922, 1951, 2140; left pleural 2, UGAMNH1917; left pleural 3, UGAMNH1912; left pleural 4, UGAMNH1933; right pleural 5, UGAMNH1934; pleural, UGAMNH1891, 1893-1895, 1903, 1916,

1921, 1923-1927, 1931, UGAMNH1932, 1935, 1936, 1939; suprapygal, UGAMNH1888; right xiphiplastron, UGAMNH1896; left xiphiplastron UGAMNH1902, 1952.

Remarks—This is a species associated with freshwater sloughs, marshes, streams, and ponds (Conant 1975).

Trachemys scripta (Schoepff)
Slider

Material—Entoplastron, UGAMNH1763, 1792, 1801, 1831; right hypoplastron axial notch, UGAMNH1780; left hypoplastron axial notch, UGAMNH1828, 1833; right hypoplastron inguinal notch, UGAMNH1774; left hypoplastron inguinal notch, UGAMNH1819; neural 1, UGAMNH1790, 1834; neural 3, UGAMNH1789; neural 8, UGAMNH1846; neural, UGAMNH1766, 1769, 1819, 1837, 1842; nuchal, UGAMNH1520, 1764, 1773, 1776, 1778, 1782, 1784, 1787, 1791, 1823, 1841, 1844; right peripheral 1, UGAMNH1768, 1770, 1826, 1827; left peripheral 1, UGAMNH1783, 1840; right peripheral 2, UGAMNH1765, 1798, 1802; left peripheral 2, UGAMNH1776, 1806; right peripheral 3, UGAMNH1794; left peripheral 3, UGAMNH1796; left peripheral 5, UGAMNH1775; left peripheral 8, UGAMNH1835, 1836, right peripheral 9, UGAMNH1779, 1793; left peripheral 10, UGAMNH1767, 1820, 1839; right peripheral 11, UGAMNH1781, 1843; left peripheral 11, UGAMNH1762, 1803-1805, 1816, 1825, 1832, 1845; peripheral, UGAMNH1785, 1824, 1829; left pleural 1, UGAMNH1807; right pleural 2, UGAMNH1799; left pleural 2, UGAMNH1800; left pleural 4, UGAMNH1788; pleural, UGAMNH1771, 1772, 1786, 1808-1815, 1821, 1822, 1838; pygal, UGAMNH1795, 1797, 1818, 1830.

Remarks—This material has the distinctive sculpted appearance of Pleistocene *Trachemys scripta*. All the material is well mineralized. It occurs in freshwater ponds, streams, and rivers (Conant 1975).

Terrapene carolina (Linnaeus)
Eastern Box Turtle

Material—Right and left epiplastron, UGAMNH1703; left hypoplastron, UGAMNH2144; left and right hypoplastron and xiphiplastron, UGAMNH1697, 1698; right hypoplastron at hinge, UGAMNH1686, 1727; left hypoplastron at hinge, UGAMN1685, 1687, 1690, 1705, 1731; right hypoplastron at inguinal notch, UGAMNH1713; right hypoplastron, UGAMNH1714; left and right hypoplastron, UGAMNH1696, 1715; hypoplastron, UGAMNH1716; neural 1, pleural and peripheral 1 and 2, UGAMNH1699; neural 1 and left and right peripheral 1, UGAMNH1732; neural 5 and 6, UGAMNH1730; neural, UGAMNH1707; nuchal, UGAMNH1704, 1725; right peripheral 1 and

2, UGAMNH1728; left peripheral 1 and 2, UGAMNH1726; right peripheral 1, 2 and 3, UGAMNH1692; left peripheral 1, 2, 3 and pleural 1, UGAMNH1720; left peripheral 3, UGAMNH1722; left peripheral 3 and 4, UGAMNHA1721; right peripheral 3 and 4, UGAMNH1708; right peripheral 5, UGAMNH1688, 1706; left peripheral 5, UGAMNH1691; right peripheral 6 and 7 and pleural 4 and 5, UGAMNH1710; right peripheral 6, 7, and 8, UGAMNH1712; left peripheral 7, UGAMNH1684; left peripheral 8, UGAMNH1702; left peripheral 8, 9, and 10, UGAMNH1694; right peripheral 9, 10, and 11, UGAMNH1733; left peripheral 10, UGAMNH1689; right peripheral 10 and 11, UGAMNH1695, UGAMNH1718; left peripheral 10 and 11, UGAMNH1719, 1734; right peripheral 10 and 11 and pygal, UGAMNH1711; left peripheral 11, UGAMNH1701; left peripheral 11 and pygal, UGAMNH1709; left and right peripheral 11 and pygal, UGAMNH1717; right peripheral 11, UGAMNH1724; left pleural 2 and peripheral 4 and 5, UGAMNH1700; pygal, UGAMNH1683, UGAMNH1723; left xiphiplastron, UGAMNH1327, 1729; left and right xiphiplastron, UGAMNH1693.

Remarks—*Terrapene carolina* can be distinguished from its extinct relative *T. carolina putnami* based on smaller size. It is a terrestrial woodland species (Conant 1975).

Terrapene carolina putnami Hay
Giant Box Turtle

Material—Right epiplastron, UGAMNH1860; left hypoplastron at inguinal notch, UGAMNH1855; left hypoplastron and epiplastron and entoplastron, UGAMNH1863; right hypoplastron and xiphiplastron, UGAMNH1864; neural 1 and pleural and peripheral 1, UGAMNH1856; nuchal, UGAMNH1865; left peripheral 3 and 4, UGAMNH1858; right peripheral 6 and 7, UGAMNH1859; right peripheral 10 and 11 and pygal, UGAMNH1862; right peripheral 1, UGAMNH1849; left peripheral 2, 3, and 4, UGAMNH1848; left peripheral 4, 5, and 6, UGAMNH1861; right peripheral 6, UGAMNH185; left peripheral 7 and 8, UGAMNH1852; left peripheral 8 and 9, UGAMNH1853; right peripheral 9, UGAMNH1847; left peripheral 10 and 11, UGAMNH1854; left pleural 2 and 3 and peripheral 4 and 5, UGAMNH1857; right pleural 2 and 3, UGAMNH1850.

Remarks—This extinct giant subspecies is common in late Pleistocene deposits of Florida where it occurred in coastal marshes and lowland savannahs. (Auffenberg 1958, Kurtén and Anderson 1980). It is readily distinguishable on the basis of its large size.

Family Testudinidae

Testudinidae gen. et sp. indet.

Material—Osteoderms, UGAMNH1645, UGAMNH1646.

Remarks—These specimens represent a large tortoise, but the osteoderms are not diagnostic.

Geochelone sp. indet.

Material—Pleural, UGAMNH1638; left hypoplastron, UGAMNH1639; right pleural 2, UGAMNH1640; left pleural 4, UGAMNH1641.

Remarks—The available material, while certainly *Geochelone*, could not be referred to a species with confidence.

Geochelone incisa (Hay)

Material—Right peripheral 7, UGAMNH1642; nuchal UGAMNH1643; right peripheral 5, UGAMNH1644.

Remarks—This material compares well with the series of *G. incisa* in the collections of the Florida Museum of Natural History and corresponds to Auffenberg's (1963) description. The was apparently an open grassland inhabitant thought to require a frost free winter (Kurtén and Anderson 1980); however, Martin and Guilday (1967) disagree.

Gopherus polyphemus (Daudin)

Gopher Tortoise

Material—Nuchal, UGAMNH1637.

Remarks—This material compares well with modern *Gopherus polyphemus* which ranges in dry sandy soils (Conant 1975).

Family Trionychidae

Trionyx sp. indet.

Material—Carapacial fragment, UGAMNH1761.

Remarks—The available material, while certainly *Trionyx* because of the distinctive pattern on the bone, could not be referred to a species with confidence.

Order Squamata

Family Colubridae

Colubridae gen. et spec. indet.

Material—Vertebrae, UGAMNH2054-2061.

Elaphe obsoleta (Say)
Rat Snake

Material—Vertebra, UGAMNH2055.

Remarks—This material compares well with modern *Elaphe obsoleta* which may be found in woodlands and grasslands (Conant 1975).

Order Crocodilia
Family Alligatoridae
Alligator mississippiensis (Daudin)
American Alligator

Material—Left angular, UGAMNH1015; distal phalanx, UGAMNH1001, right dentary (without teeth), UGAMNH1012; dermal scutes, UGAMNH1003-1011 (1010 and 1011 exhibit crossmends), UGAMNH1023; right femur, UGAMNH1020, 1022; left humerus, UGAMNH1019; fused parietals, UGAMNH1025; left scapula, UGAMNH1014; right scapula, UGAMNH1016, 1018; teeth, UGAMNH1002, 1024, 1026, 1028, 1029; vertebra, UGAMNH1017; frontal, UGAMNH1013; left jugal, UGAMNH1021.

Remarks—This material has the distinctive *Alligator mississippiensis* morphology and it compares well with modern examples. Alligators occur in both fresh and brackish waters (Conant 1975).

CLASS AMPHIBIA
Order Caudata
Family Sirenidae
Siren sp. indet.

Material—Vertebrae, UGAMNH2129-2131, 2161.

Remarks—The available material compares well with modern *Siren*.

Order Anura
Anura gen. et sp. indet.

Material—Vertebrae, UGAMNH2132-2134-right humerii.

Remarks—The available material, while certainly frog, could not be referred to a genus or species with confidence.

CLASS OSTEICHTHYES
Order Lepisosteiformes
Family Lepisosteidae
Lepisosteus sp. indet.

Material—Scales, UGAMNH2109-2111.

Remarks—The scales, while certainly *Lepisosteus*, could not be referred to a species with confidence. *Lepisosteus* occurs in freshwater and estuarine habitats (Hoese and Moore 1977, Lee et al. 1980).

Order Amiiformes
Family Amiidae
Amia calva Linnaeus
Bowfin

Material—Left dentary, UGAMNH2088; left frontal, UGAMNH2089; cervical vertebra, UGAMNH2090.

Remarks—This material compares well with modern specimens of *Amia calva*. The bowfin is a freshwater and estuarine species (Hoese and Moore 1977, Lee et al. 1980).

Order Siluriformes
Family Ictaluridae
Ictaluridae gen. et sp. indet.

Material—Spine, UGAMNH2112; vertebra, UGAMNH2113.

Remarks—The available material, while certainly catfish, could not be referred to a genus or species with confidence.

Pylodictis cf. *P. olivaris* (Rafinesque)
Flathead Catfish

Material—Left proximal coracoid, UGAMNH2119.

Remarks—The morphology of the single element is very similar to modern specimens of *P. olivaris* and distinct from the other known regional ictalurids available for comparison. The specimen at hand shows some evidence of mineralization, but mineralization is not extensive. The species occurrence in the St. Marks River is outside its reported range which extends from northeastern Mexico east throughout Gulf of Mexico drainages to Mobile Bay (Lee et al. 1980 et seq.). However, in recent times the species has undergone introductions and populations are now known from at least the Appalachicola-Chatahoochee System (M. and B. J. Freeman, University of Georgia, personal communication). Uyeno and Miller (1962) reported some specimens of *P. olivaris* from the Trinity River Terrace, Texas. The deposit was dated to the Sangamon (late Pleistocene); however, that site is within the present range of the species. It is a freshwater species (Hoese and Moore 1977, Lee et al. 1980).

Family Ariidae
Ariidae gen. et sp. indet.

Material—Spine, UGAMNH2114-2116; cervical vertebrae, UGAMNH2117, UGAMNH2118.

Remarks—These specimens show the characters of the marine catfishes, although species identification is not possible.

Arius felis (Linnaeus)
Hardhead Catfish

Material—Spine, UGAMNH2091.

Remarks—This spine compares well with the distinctive *Arius felis* morphology. This species is restricted to saltwater and estuaries (Hoese and Moore 1977, Lee et al. 1980).

Order Salmoniformes
Family Esocidae
Esox sp. indet.

Material—Right dentary, UGAMNH2101, left dentary UGAMNH2095, 2096, 2098-2100, 2102-2105; dentary, UGAMNH2097; parasphenoid, UGAMNH2106; pharyngeal grinding plates, UGAMNH2107, 2108.

Remarks—These specimens closely resemble both *E. americanus* Gmelin and *E. niger* Lesueur. Both are considered freshwater species (Lee et al. 1980 et seq.) and occur in regional waters today.

Order Perciformes
Family Percichthyidae
Morone saxatilis (Walbaum)
Striped Bass

Material—Right maxilla, UGAMNH2082; right premaxilla, UGAMNH2083; right quadrate, UGAMNH2084, 2085; left quadrate, UGAMNH2086; atlas, UGAMNH2087.

Remarks—This material compares well with modern examples of *Morone saxatilis* which occurs in both coastal saltwater and estuaries (Hoese and Moore 1977, Lee et al. 1980).

Family Sparidae
Archosargus probatocephalus (Walbaum)
Sheepshead

Material—Right dentary, UGAMNH2079; left preoperculum, UGAMNH2080; tooth, UGAMNH2081.

Remarks—This material compares well with modern examples of

Archosargus probatocephalus. The sheepshead is a coastal saltwater and estuary species (Hoese and Moore 1977, Lee et al. 1980).

Family Sciaenidae
Sciaenops ocellatus (Linnaeus)
Red Drum

Material—Quadrate, UGAMNH2092.

Remarks—This material compares well with modern examples of *Sciaenops ocellatus*. It is a coastal saltwater species, but is also associated with estuaries (Hoese and Moore 1977, Lee et al. 1980).

Family Mugilidae
Mugil sp. indet.

Material—Vertebrae, UGAMNH2093, UGAMNH2094.

Remarks—The available material, while certainly *Mugil*, could not be referred to a species with confidence. *Mugil* is a coastal saltwater species (Hoese and Moore 1997, Lee et al. 1980).

RESULTS AND DISCUSSION

Chronology and Environment of Deposition

Of several thousand separate skeletal elements recovered from the St. Marks River, 1,162 were referable to specific taxa. Included are 37 species of mammals, 3 birds, 13 reptiles, 2 amphibians, and 9 fish. An additional 23 species of birds were identified from the 1972 collection made by Storrs Olson. Of all species we reported, 14 mammals and 2 reptiles are restricted to the Pleistocene. The remaining are representative of the modern extant regional fauna. With the exception of modern contaminants, the latter are acceptable Pleistocene species; however, they more probably represent a mixture of Holocene and Pleistocene material. This is reflected in the range of mineralization observed in many species. In all cases those species known only from the Pleistocene are well mineralized. However, several species with both a Pleistocene and Recent occurrence such as horse and deer exhibit both well mineralized and, what appears to be, very recent unmineralized condition. Modern contaminants such as cow and pig are unmineralized. In general, mineralization is no criterion of Pleistocene deposition. The problem of apparent heterochronous deposition and separation of Pleistocene and Holocene materials is exacerbated by the apparent rapid mineralization that can occur in reducing environments. Neill (1957) noted that rapid mineralization of organic remains in Florida creates the illusion that Recent material is of older age. Nonetheless, the St. Marks River

fauna is clearly mixed and reflects heterochronous deposition over time beginning no later than the late Pleistocene (Wisconsinan) and extending through the Recent.

We compared the St. Marks River faunal list and a modern regional faunal list of the Apalachicola River system (Means 1976). Of the 344 species listed by Means, 29% of the mammals, 10% of the birds, 19% of the reptiles, 5% of the amphibians, and 2% of the fish are represented in the St. Marks River fauna. This bias toward mammals probably reflects taphonomic factors associated with the larger size of mammalian elements in a fluvial environment. Small, more fragile vertebrates (birds, reptiles, amphibians, and fish) are clearly under-represented in the St. Marks River fauna. This bias is reflected also in the mammalian fauna where chiropteran, insectivoran, and small rodent remains are conspicuously absent.

While many of the species recovered from the St. Marks River are eurytopic and provide only limited information regarding the environment of deposition, a number are stenotopic and are considered good environmental indicators.

Mammals—The mammalian fauna, in particular, is very useful in assessing the chronology and paleoenvironment of the St. Marks River. The reason for this is two-fold. First, mammals are the most numerous and have the largest component of extinct forms. Second, Florida has an extremely rich and well-documented late Pleistocene as well as modern mammalian fauna upon which comparisons to the St. Marks River fauna can be made.

Thirteen (35%) of the mammalian fauna of the St. Marks River is represented by extinct forms. These include *Holmsina septentrionalis*, *Megalonyx jeffersonii*, *Glossotherium harlani*, *Canis dirus*, *Smilodon* sp., *Synaptomys australis*, *Tapirus*, sp., *Equus* sp., *Platygonus compressus*, *Hemiauchenia macrocephala*, *Paleolama mirifica*, *Mammut americanum*, and *Mammuthus jeffersonii*. This closely approximates the relative percentage of extinct mammals from a number of Rancholabrean faunas from elsewhere in Florida (Martin and Webb 1974). The temporal span of the extinct forms ranges from Blancan through Recent. However, they all share a late Wisconsinan chronology. Those species representing extant forms, although individually some exhibit a longer stratigraphic history, also share a late Wisconsinan chronology. With few exceptions, all the extant species are represented in the local fauna today.

Comparison of the known and inferred habitat preferences or requirements of the extant and extinct mammalian species suggests the depositional environment was heterogeneous. On one hand there are a number of essentially woodland species: *Didelphis*, *Holmsina*,

Megalonyx, *Lutra*, *Mephitis*, *Urocyon*, *Ursus*, *Tapirus*, *Platygonus*, *Odocoileus*, and *Mammut*. However, grassland species are well represented also: *Glossotherium*, *Mephitis*, *Geomys*, *Equus*, *Hemiauchenia*, *Paleolama*, *Bison*, and *Mammuthus*. From a simple listing it might appear that grassland species are about as common as woodland species. However, when compared by the number of identified specimens per taxon, woodland species are more prevalent. Despite criticism, this method is reliable for a comparison of relative abundances of species (Grayson 1984). In addition, a number of species indicate proximity of water: *Didelphis*, *Lutra*, *Procyon*, *Ursus*, *Castor*, *Neofiber*, *Ondatra*, *Synaptomys*, and *Tapirus* are all typically associated with moist, riparian, or standing water habitats.

Birds—Storrs Olson's collection from the St. Marks River have never been published. He was kind enough to provide a list of the birds identified and has permitted us to include it in the present discussion. Olson (personal communication) felt that "there was very little of interest among the birds" mainly because the list of avian species recovered from the St. Marks River is essentially similar to the modern fauna (Means 1976). As a whole, birds are uninstructive concerning the dating of the St. Marks River fauna. They do, however, provide considerable information relating to the environment of deposition.

The St. Marks River avian fauna is clearly biased toward large species with predominantly salt and freshwater marshland habitat preferences: *Podiceps*, *Podilymbus*, *Phalacrocorax*, *Ardea*, *Butorides*, *Egretta*, *Eudocimbus*, *Aix*, *Anas*, *Aythya*, *Branta*, *Bucephala*, *Lophodytes*, *Padion*, *Fulica*, *Gallinula*, and *Aramus*. In addition, a number of the species are typically associated with woodlands or woodland riparian habitats: *Aix*, *Mergus*, *Buteo*, and *Strix*. Conspicuously absent are the passeriforms. This probably represents the taphonomic bias referred to above. While a significant number of the birds are often present in saltwater marsh habitats, there are no shorebird (charadriform) species present.

Reptiles and Amphibians—Many turtles, but few other reptiles, are reported from the St. Marks River. Emydid turtles, in particular, are well represented and make up approximately 90% of the recovered reptilian material. In fact, in numbers alone they make up well over one third the individual elements in the fauna. The emydid turtle species identified from the 1987 collection were *Pseudemys concinna*, *P. floridanus*, *P. nelsoni*, *Trachemys scripta*, and *Terrapene carolina*, all of which are found in the area today. *Pseudemys* and *Trachemys* are indicative of a freshwater environment, while *Terrapene* is terrestrial. An extinct, large, late Pleistocene subspecies of *Terrapene*

carolina, *T. c. putnami*, is represented in the St. Marks River fauna by a number of elements. It was probably limited to the Coastal Plain and Savannah habitats (Auffenberg 1958) and is represented in many late Pleistocene sites in Florida. Other aquatic turtles recovered include one chelydrid, *C. serpentina*, and a number of unreferrable kinosternid fragments. Terrestrial testudinoid turtles present at the site are *Geochelone incisa*, *Geochelone* sp., and *Gopherus polyphemus*. *Geochelone incisa* represents a definite late Pleistocene species, as does *Terrapene carolina putnami*. *Gopherus polyphemus* occurs in the area today.

Only two snakes, *Nerodia* sp. and *Elaphe obsoleta*, were identified from the 1987 collection. Both snakes occur in the area today. No lizards were identified from any of the fossil collections. Two amphibians were recovered, one caudate and one anuran, neither of which could be identified to species.

With the exception of the two late Pleistocene components, the herpetofauna is representative of the modern regional fauna and includes both lower Coastal Plain riverine and marshland species, as well as terrestrial forms.

Fishes—The fish fauna described includes both freshwater and marine forms. *Ariopsis felis*, *Morone saxatilis*, *Archosargus probatocephalus*, *Sciaenops ocellata*, and *Mugil* sp. although typically marine are also estuarine tolerant. The freshwater fishes include *Pylodictis* cf. *P. olivaris*, *Lepisosteus* sp., *Esox* sp., and *Amia calva*. Of these, *Lepisosteus* sp., *Esox* sp., and *A. calva* tolerate estuarine, but not marine, conditions (Hoese and Moore 1977).

In conclusion, the aquatic community suggests a mixed freshwater and marine, or more likely an estuarine environment, similar to the lower half of the St. Marks River drainage today. The terrestrial fauna indicates a wooded riparian environment also similar to that found in the St. Marks River drainage today. However, the presence of *Hemiauchenia*, *Bison*, *Equus* sp., and *Mammumthus* coupled with *Geomys*, *Geochelone*, and *Gopherus* suggests that more open, semi-forested savannah habitats were also represented. This is consistent with other late Pleistocene (Rancholabrean) faunas from the panhandle of Florida, some of which are considered below.

Faunal Comparison

The Chipola River sites (IA and IIA)—This is a river deposit similar to the St. Marks River and contains similar species including *Didelphis virginiana*, *Holmesina septentrionalis*, *Castor canadensis*, *Procyon lotor*, *Bison* sp., *Equus* sp., *Mammut americanum*, *Odocoileus virginianus*, and *Hemiauchenia macrocephala* (Webb

1974*a*). Although no formal paleontological description of the site exists, the species present in that assemblage indicate a mixed woodland/grassland environment (Webb 1974*a*).

The Aucilla River IA site—The site is also similar to the St. Marks River in depositional and temporal characters. No published paleontological description exists for this site either, but from the fauna a habitat of woodland and marsh can be assumed. It includes *Didelphis virginiana*, *Holmesina septentrionalis*, *Glossotherium* cf. *G. harlani*, *Ondatra zibethicus*, *Castor canadensis*, *Neochoerus pinckneyi*, *Sylvilagus floridanus*, *Canis dirus*, and *Tremarctos floridanus* (Webb 1974*a*).

Wakulla Springs—This, too, is similar to the St. Marks River in depositional and temporal characters. Included are *Mammuthus* sp., *Mammut americanum*, and *Bison bison antiquus* (Webb 1974*a*). No formal paleontological description of the site exists.

Generally there are only slight differences between the St. Marks River and other Florida panhandle, riverine deposits. These differences can probably be attributed to a number of causes including collection by amateurs, undersampling, taphonomic events, or other collecting biases.

Compared to the other Rancholabrean faunas from peninsular Florida (Martin and Webb 1974, Webb 1974*a*, Webb and Wilkins 1984), the St. Marks River assemblage probably is not representative of the full late Pleistocene fauna that existed in the area. For example, more than 50 species of mammals are known to have been present in Florida during the time of accumulation of the Ichetucknee River fauna, Columbia County, Florida (Martin and Webb 1974). As shown by Martin and Webb (1974) mammalian faunal diversity was considerably elevated in peninsular Florida during Rancholabrean time, and it is highly likely that is was the case along the rich fluvio-estuarine environment of the panhandle during the same period.

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